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(54) **FORMWORK ELEMENT AND FORMWORK SYSTEM FOR STRUCTURAL ELEMENTS**

(57) The present invention concerns a finishing piece (1) that serves as a self-supporting disposable formwork for structural elements that is integrated into the structural element and that also serves as finishing for the structural element. This finishing piece (1) comprises two construction elements (2) placed in a substantially parallel position and substantially coextensive with each other, and that are connected by connecting elements (3). The construction element (2) comprises a panel (2.1) in which protective elements (2.3) are embedded in the uppermost and lowermost surfaces, and which in the inner surface incorporates fitting elements (2.2) for fitting the connecting elements (3).

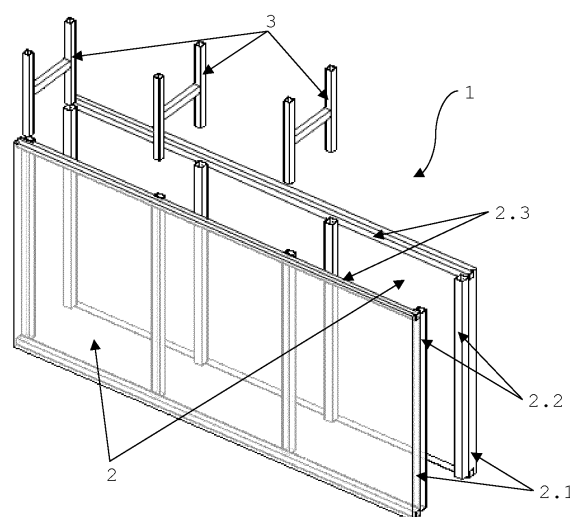


Figure 4

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Description

Technical field

[0001] The present invention falls within the field of building construction. In particular, it concerns an element to carry out disposable formwork, more specifically, a finishing piece that serves as a definitive self-supporting and finishing formwork for structural concrete elements that is integrated into the structural element.

Framework of the invention

[0002] In building construction, when it is necessary to execute a vertical structure, such as, e.g., walls, pillars, or elevator cores, it is necessary to assemble a support structure, usually using metal, wood, plastic, or other less common material, with the purpose of avoiding landslides or to delimit and retain concrete as in a kind of reservoir, which guarantees that, through a watertight structure, the structure maintains its shape until it is completely dry or solidified.

[0003] These structures, called formwork, have the disadvantage of needing to be dismantled after the structure is dry or solidified.

Background of the invention

[0004] A few documents were found that make reference to elements for the execution of formwork.

[0005] In particular, document EP0757137 presents a formwork for the production of structures to obtain prefabricated panels for façade claddings.

[0006] Also worth mentioning is document WO0222982, which discloses a formwork panel made of an insulating material and incorporating a reinforced metal core.

[0007] Also, document EP1434919, which presents hollow panels connected together to execute a formwork.

[0008] Document FR2930795A1 refers a ladder shaped spacer for cast concrete wall construction, has posts including sections cooperating in longitudinal sliding relation with profiles of rails of panels and setting plane of ladder orthogonal to planes of panels, respectively.

[0009] However, no document was found that refers to a solution for a definitive formwork for structural elements made of concrete that is integrated into the structural element and that simultaneously serves as the finishing of the structure itself.

Advantages of the Invention

[0010] Currently, the most common method used for the execution of reinforced concrete structures is the so-called traditional formwork, which requires the use of several formwork systems, with all that this practice implies, such as the use of dismantling oils, spacers to ensure

overlap, since, once the task is complete, the formwork must be dismantled and cleaned, as well as the need to correct imperfections resulting from concreting.

[0011] There is also the need to create negatives in the several elements for shoring up the formwork, which must then be sealed, or use expensive parts to ensure this sealing.

[0012] In the solution presented in this document, it is the finishing piece itself that serves as the formwork and finishing for the structural elements and guarantees their covering, as well as the final finishing of the elements to be concreted. It can be made of white or dyed concrete, and it can have exposure classes that are suited to the location where the work is to be done, which makes this solution very versatile in terms of finishing.

Brief description of the drawings

[0013] These and other features can be easily understood in the accompanying drawings, which should be considered mere examples and in no way restrictive of the scope of the invention. In the drawings, and for illustrative purposes, the measurements of some of the elements may be exaggerated and not drawn to scale. The absolute dimensions and the relative dimensions do not correspond to the actual relationships for the realization of the invention.

[0014] In a preferred embodiment:

Figure 1 shows a rear view of the construction element.

Figure 2 shows a side view of the construction element.

Figure 3 shows a top view of the construction element.

Figure 4 shows an exploded perspective view of the top of the finishing piece.

Figure 5 shows several finishing pieces being assembled horizontally to form a horizontal line of formwork.

Figure 6 shows a cutaway of two vertically mounted finishing pieces, where it is possible to see how a connecting element and four construction elements are fitted together.

[0015] The elements and components of the equipment of the present invention and the elements necessary for the operation of the invention are marked in the figures:

1. finishing piece
2. construction element

- 2.1. panel
- 2.2. fitting element
- 2.3. protective element

- 3. connecting element
- S shoe

Detailed description of the invention

[0016] By shapes: "substantially parallelepiped", "substantially H-shaped" are meant as preferred shapes for embodiments of the invention, which can work in other shapes.

[0017] By positions: "substantially parallel", "substantially coplanar", "substantially at the same distance" are understood as preferred positions for embodiments of the invention, which can work in other positions.

[0018] By dimensions: "substantially coextensive", "substantially the same width" are understood as preferred dimensions for embodiments of the invention, which can work with other dimensions.

[0019] With reference to the figures, the present invention refers to a finishing piece (1) that serves as a self-supporting disposable formwork for structural elements and is integrated into the structural element, also serving as a finishing for the structural element.

[0020] This finishing piece (1) comprises two construction elements (2) placed in a substantially parallel position and substantially coextensive with each other, and that are connected by connecting elements (3).

[0021] The construction element (2):

- is formed by a panel (2.1) made of, namely, but not exclusively, white or dyed concrete, that has a substantially parallelepiped shape, but that can have any other shape that is appropriate to the needs of the structural element being erected;
- in the uppermost and lowermost surfaces of the panel (2.1), protective elements (2.3) are embedded;
- the panel (2.1) is peripherally protected by metal elements to prevent the edges of the construction elements (2) from breaking during assembly and during transport and storage;
- the inner surface of the panel (2.1) is a rough surface that enables better adhesion of the concrete;
- the inner surface of the construction elements (2) incorporates fitting elements (2.2) into which the connecting elements (3) fit;
- its size can be adjusted to the size of the site and to the means available for assembly, such as lifting gear and available space on site.

[0022] The fitting elements (2.2) are, notably but not exclusively, polygonal tubes or cylindrical tubes, hollow on the inside, so that they can receive the connecting elements (3). The protective elements (2.3) are, notably but not exclusively, polygonal tubes. The fitting elements (2.2) and the protective elements (2.3) are made of any

suitable material, including but not limited to steel, iron, plastic, or carbon fibre.

[0023] In case the fitting elements (2.2) and the protective elements (2.3) are made of steel or iron, the construction element (2) is hot-dip galvanized to avoid possible future corrosion problems.

[0024] The connecting elements (3) are substantially H-shaped, but can have any other shape that suits the needs of the structural element being erected. They comprise tubes with the same geometric shape as the fitting elements (2.2) but with a smaller perimeter than the perimeter of the fitting elements (2.2) since they have to engage inside the fitting elements (2.2).

[0025] The connecting elements (3) guarantee the distance between the construction element (2) and the construction element (2) that is diametrically opposite to it, ensuring that all finishing pieces (1) that are part of the structural element being erected have construction elements (2) that are substantially at the same distance from the construction element (2) that is diametrically opposite to them, ensuring that the entire structural element is substantially the same width. The connecting elements (3) also ensure that all the finishing pieces (1) are substantially coplanar, allowing the various finishing pieces (1) to be fixed to each other and serving as a guide and support for the uppermost finishing pieces (1), avoiding the need for shoring or other temporary support of the construction elements (2).

[0026] After being assembled, the assembly is self-supporting and does not require additional shoring beyond what is necessary to ensure the verticality of the elements to be concreted.

[0027] For the realization of the structural element, all the necessary reinforcement for the structural element to be executed is executed and then a plurality of finishing pieces (1) are assembled in sequence, both vertically and horizontally. After all finishing pieces (1) are in place, i.e., the elements that make up the formwork are in place, it is possible to execute the structural element by pouring the concrete in the space enclosed by the construction elements (2).

Claims

1. Formwork element comprising a finishing piece (1) incorporating two construction elements (2) placed in a substantially parallel position and substantially coextensive with each other and that are connected by connecting elements (3), wherein the construction element (2):

- is formed by a panel (2.1),
- protective elements (2.3) are embedded in the uppermost and lowermost surfaces of the panel (2.1),
- includes on the inner surface embedding elements (2.2) on to which connecting elements (3)

- fit,
- and the connecting elements (3) are substantially H-shaped.
2. Formwork element according to claim 1, wherein the panel (2.1) is made of white or dyed concrete.
 3. Formwork element according to any of the preceding claims, wherein the inner surface of the panel (2.1) is a rough surface.
 4. Formwork element according to any of the preceding claims, wherein the panel (2.1) has a substantially parallelepiped shape.
 5. Formwork element according to any of the preceding claims, wherein the fitting elements (2.2) are polygonal tubes or cylindrical tubes, hollow on the inside.
 6. Formwork element according to any of the preceding claims, wherein the protective elements (2.3) are polygonal tubes.
 7. Formwork element according to claims 5 and 6, wherein the fitting elements (2.2) and the protective elements (2.3) are made of steel, iron, plastic, or carbon fibre.
 8. Formwork element according to any of the preceding claims, wherein the connecting elements (3) comprise tubes having the same geometric shape as the fitting elements (2.2).
 9. Formwork element according to the preceding claim, wherein the connecting elements (3) have a smaller perimeter than the perimeter of the fitting elements (2.2).
 10. Formwork element according to any of the preceding claims, wherein the protective elements (2.3) are polygonal tubes.
 11. Formwork system for structural elements according to the preceding claims, wherein it comprises a plurality of finishing pieces (1) assembled sequentially vertically and horizontally.
 12. Formwork system according to the preceding claim, wherein the formwork system is self-supporting.
 13. Formwork system according to claims 11 and 12, wherein the formwork system is integrated into the structural element.

Amended claims under Art. 19.1 PCT

1. Formwork element comprising a finishing piece (1) incorporating two construction elements (2) placed in a substantially parallel position and substantially coextensive with each other and that are connected by connecting elements (3) substantially H-shaped, each construction element (2):
 - being formed by a panel (2.1),
 - having protective elements (2.3) embedded in the uppermost and lowermost surfaces of the panel (2.1),
 - including on the inner surface embedding elements (2.2) on to which connecting elements (3) fit,
 wherein the connecting elements (3) comprise tubes having the same geometric shape as the fitting elements (2.2) and a smaller perimeter than the perimeter of the fitting elements (2.2).
2. Formwork element according to claim 1, wherein the panel (2.1) is made of white or dyed concrete.
3. Formwork element according to any of the preceding claims, wherein the inner surface of the panel (2.1) is a rough surface.
4. Formwork element according to any of the preceding claims, wherein the panel (2.1) has a substantially parallelepiped shape.
5. Formwork element according to any of the preceding claims, wherein the fitting elements (2.2) are polygonal tubes or cylindrical tubes, hollow on the inside.
6. Formwork element according to any of the preceding claims, wherein the protective elements (2.3) are polygonal tubes.
7. Formwork element according to claims 5 and 6, wherein the fitting elements (2.2) and the protective elements (2.3) are made of steel, iron, plastic, or carbon fibre.
8. Formwork element according to any of the preceding claims, wherein the protective elements (2.3) are polygonal tubes.
9. Formwork system for structural elements according to any of the preceding claims, wherein it comprises a plurality of finishing pieces (1) assembled sequentially vertically and horizontally.
10. Formwork system according to the preceding claim, wherein the formwork system is self-supporting.

11. Formwork system according to claims 9 and 10, wherein the formwork system is integrated into the structural element.

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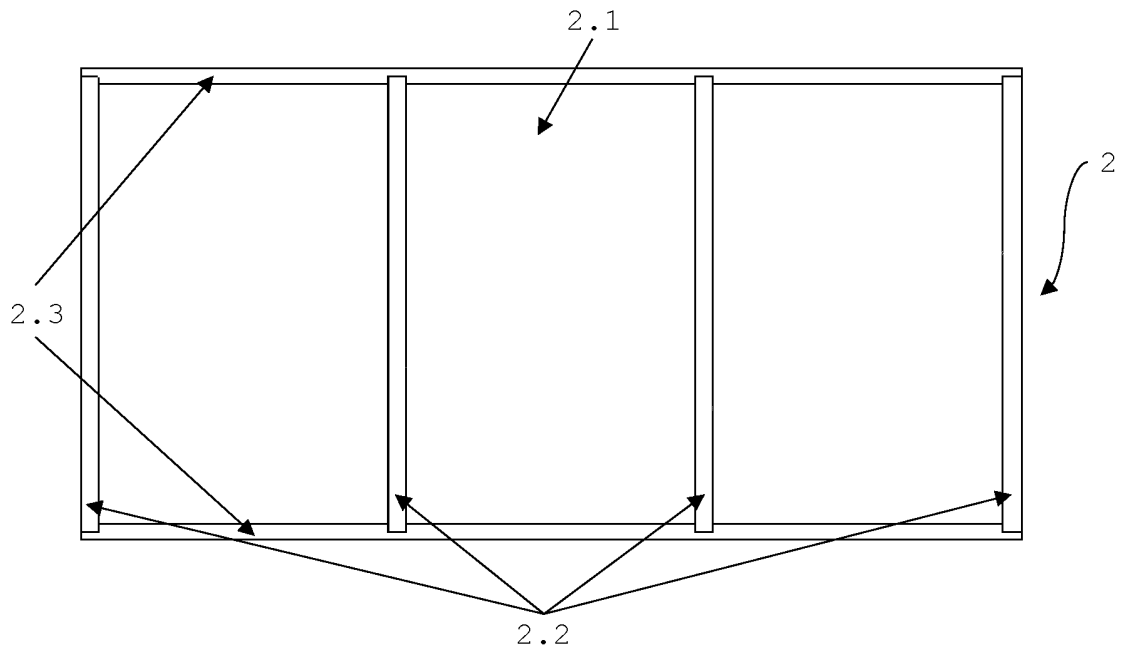


Figure 1

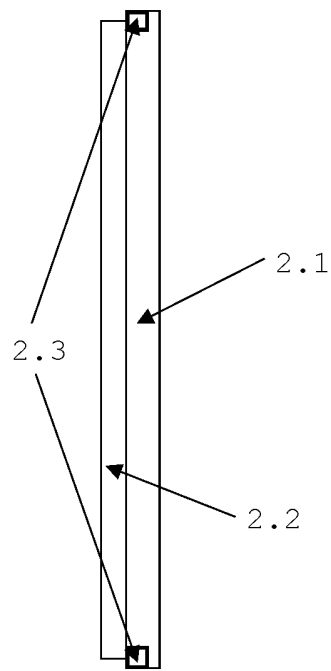


Figure 2

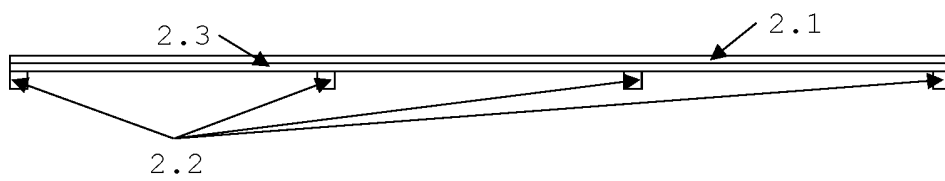


Figure 3

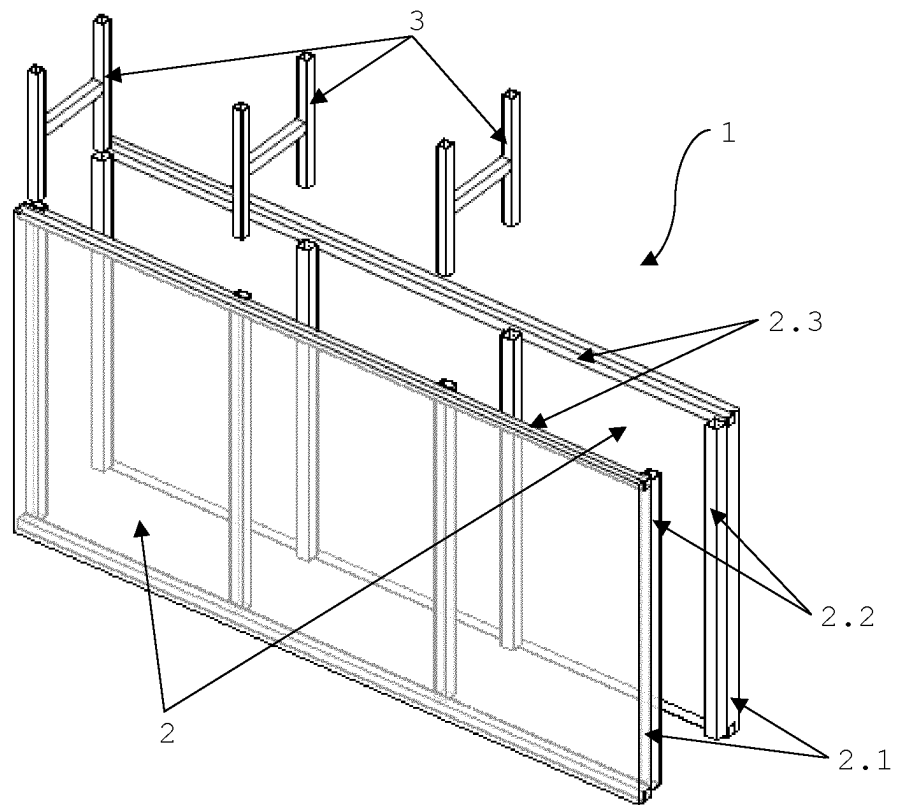


Figure 4

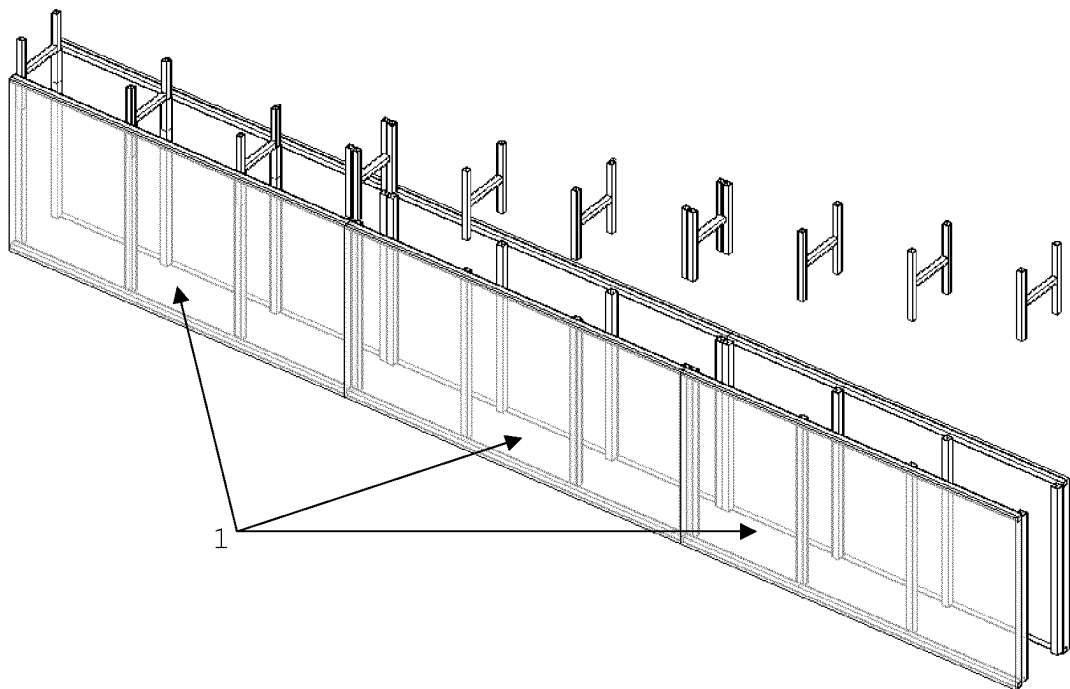


Figure 5

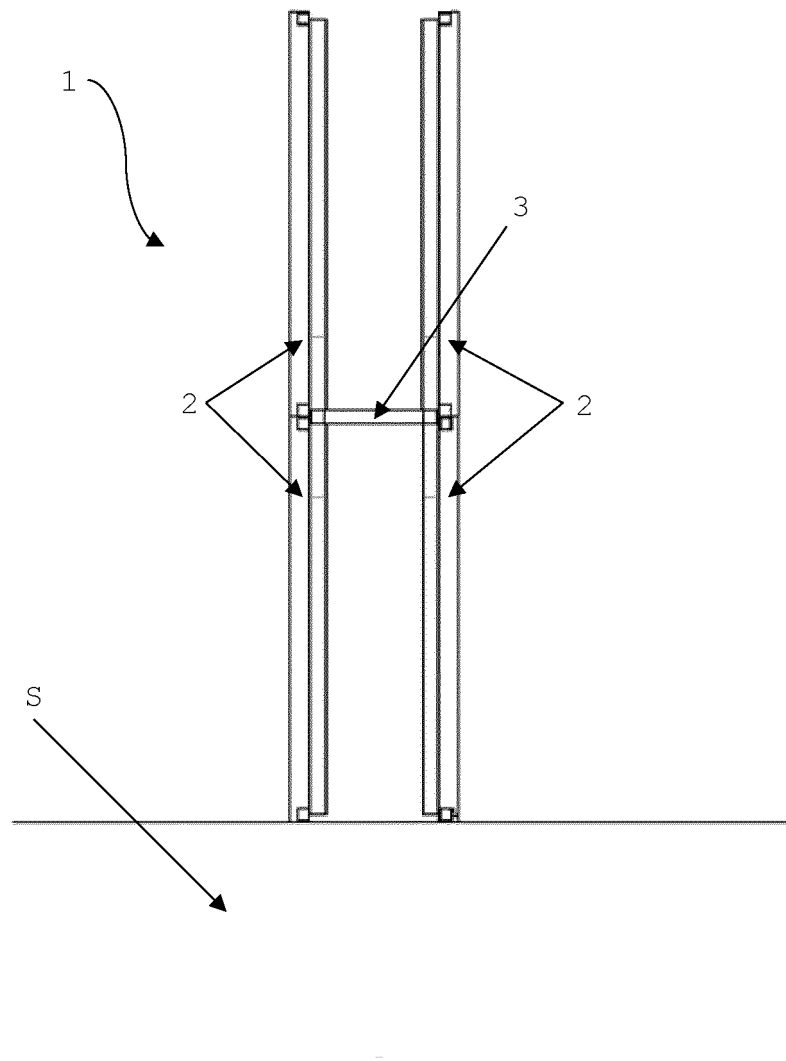


Figure 6

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2022/051043

A. CLASSIFICATION OF SUBJECT MATTER

INV. E04B2/86

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E04B E04G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 930 795 A1 (H 2 O BATIMENT SARL [FR]) 6 November 2009 (2009-11-06) page 4, line 28 - page 10, line 10; figures	1-13
A	----- CN 102 116 058 B (SHANGHAI URBAN CONSTR DESIGN) 25 July 2012 (2012-07-25) paragraph [0025] - paragraph [0043]; figures	2, 3
A	----- GB 2 529 688 A (WIDDOWFIELD SIMON [GB]) 2 March 2016 (2016-03-02) page 7, paragraph 3 - page 14, paragraph 3; figures	2, 3, 5-10
A	----- WO 99/47768 A1 (CHOI CHUNG HO [KR]; KEE SEUNG CHERL [KR]) 23 September 1999 (1999-09-23) page 5, line 3 - page 10, line 14; figures	1



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

21 May 2022

Date of mailing of the international search report

31/05/2022

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2022/051043

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REFERENCES CITED IN THE DESCRIPTION

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